DOCUMENT RESUME

ED 257 565 PS 015 163

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TITLE Toddlers' Flexibility in Production of Similarity and Thematic Relations.
PUB DATE Apr 85
NOTE 14p.; Paper presented at the Biennial Meeting of the Society for Research in Child Development (Toronto, Ontario, Canada, April 25-28, 1985).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Age Differences; Cognitive Ability; *Cognitive Development; *Preschool Children; Preschool Education; *Research Methodology; *Toddlers
IDENTIFIERS Developmental Patterns; Elicitation Techniques; Flexibility (Cognition); *Taxonomic Relations; *Thematic Relations

ABSTRACT

Recent work suggests that the apparent shift from thematic to taxonomic concept organization reflects changes in children's preference for these forms of organization, rather than their capacity. A study was made to assess toddlers' knowledge of the different possible relations for the same concept and to extend the triad method to children under three years of age by employing an elicited imitation technique. Attempts were made to elicit both thematic and similarity relations for several target concepts. Forty-one subjects, assigned to younger and older toddler age groups with mean ages of 21 and 33 months, were given an imitation conceptual preference task involving triads of objects. On each trial, the experimenter modeled and described a similarity relation between the target and a second object, and a thematic relationship between the target and a third object. No differences were found between the groups' imitations of either type of relationship alone. However, older subjects were more likely than the younger subjects to imitate both relationships, and less likely to produce partial or incorrect responses. The results indicate an increase with age not in the availability of similarity and thematic relations, but rather, in the flexibility with which both relations will be produced. (Author/RH)

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Toddlers' Flexibility in Production of Similarity and Thematic Relations

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Paper presented to the Society for Research in Child Development
Toronto, Ontario April, 1985

PS 015163

ABSTRACT

Recent work suggests that the apparent shift from thematic to taxonomic concept organization reflects changes in childrens' preference, rather than capacity, for these forms of organization. We attempted to elicit both thematic and similarity relations for several target concepts. Two groups of 20 subjects, whose ages averaged 21 and 33 months, were seen. The subjects were given an imitation conceptual preference task involving triads of objects. On each trial, the experimenter modeled and described a similarity relation between the target and a second object, and a thematic relationship between the target and a third object. There were no differences between the groups' imitations of either type of relationship alone. However, older subjects were more likely than the younger subjects to imitate both relationships, and less likely to produce partial or incorrect responses. The results indicate an increase with age not in the availability of similarity and thematic relations, but rather, in the flexibility with which both relations will be produced.

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INTRODUCTION

How does the preschool child organize objects in the world? Early work by Piaget and Vygotsky indicated a shift from thematic to taxonomic forms of organization at the end of the preschool years. For example, given a set of familiar objects, Piaget found that four-year-olds typically arranged the objects in such a way as to represent familiar events. As an example, the child might put a number of houses together to form a village and have a person lead the cows and sheep to the village. Five and one-half year olds were more likely to sort the objects into similarity-based groups which were given taxonomic labels, e.g. "houses," "people," and "animals." Taxonomic groupings were thought to rely upon cognitive operations not available until the emergence of concrete operations.

A number of researchers have provided evidence that preschool children can use similarity consistently as a basis for sorting objects, particularly if they are given some form of task support for doing so. A recent example of this line of research is that by Markman, Cox and Machida (1981), who suggest that young children are seduced into thematic constructions by the salience of spatial arrangement. When given plastic bags for sorting, as opposed to flat surfaces, children as young as three years of age created taxonomic sorts. Markman et al. argue that flat surfaces "pull for"

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arrangements of the objects into configurations which represent familiar events, i.e., thematic constructions. This finding is consistent with much neo-Piagetian research which suggests that, given contextual support, young children demonstrate skills which are not thought to emerge until considerably later.

These findings have led some researchers to argue that increased utilization of taxonomic bases of organization reflects changes in the relative salience, availability, or preference for thematic and taxonomic modes of organization, rather than the emergence of new classificatory skills. For example, Smiley and Brown (1979) presented subjects with triads of objects such that one pair of items represented similarity relations, another pair represented thematic relations, and the third pair made no sense. Subjects were asked to tell which two objects went together and why. The researchers found that, when forced to choose between a thematic pairing and a taxonomic pairing, preschoolers preferred the thematic pairing, but could also provide a taxonomic explanation for the similarity pairing.

This work supports a contention by Nelson (1977) that the young child has, for each concept, multiple properties, functions and relations. For example, the concept "ball" involves properties, such as "round" and "white," functions, such as "bounces" and "rolls," and relations into which it

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can enter, such as 'play with parent' or 'hit with bat.' If the young child's concepts involve information about both the appearance and use of the members of that category, the child should be able to link the concept to others both thematically and taxonomically.

A good candidate for eliciting both thematic and taxonomic relations is the triad method, such as that employed by Smiley and Brown (1979). The triad method involves verbal concepts such as 'alike' and 'go together' which may be difficult for a toddler to comprehend. Therefore, the purposes of the present study were: (1) to extend the triad method to younger children (under three years) by employing an elicited imitation technique; and (2) to assess toddlers' knowledge of the different relations possible for the same concept.

METHOD

Subjects

A total of 41 subjects participated in the study: 20 subjects aged 19 to 23 months, mean age of 21 months, 10 females and 10 males; and 21 subjects aged 30.5 to 36 months, mean age of 33 months, 12 females and 9 males.

Procedure

Subjects in both groups were administered five trials of an imitation conceptual preference task. For each trial, three natural objects were used: a target object, one which belonged to the same category and was similar in function to the target object, and one which was related thematically to the target object.

With the 20 month old subjects only, each object was presented to the subject individually prior to its being employed in the conceptual preference triad. The experimenter labeled each object, handed it to the subjects and allowed them to manipulate it. This procedure was not followed with the older subjects. Their first acquaintance with the objects was during the experimental trial.

For each target object, the experimenter demonstrated and described verbally a similarity relationship and a thematic relationship. An example which uses a bird as the target object follows: "This is a plane. And here is a bird. Both of these can fly (flying both together)." The plane was then removed from the table and replaced by an egg. "And here is the bird. And this is an egg. The bird sits on the egg to hatch it (placing the bird on the egg)." All three objects were then given to the subject, with the target object in the center. The experimenter asked the subject, "Can you show me

what they do?' The subjects were provided ample time to manipulate the objects. If the subject stopped engaging the objects before demonstrating both relationships, the experimenter asked, 'Can you show me what else they do?' The trial ended when the subjects indicated that they were finished with the materials, e.g. by pushing them back to the experimenter.

A total of five triads were modeled for each subject:

Similarity Relation	Thematic Relation
Plane -- Bird	Bird -- Egg
Hairbrush -- Toothbrush	Toothbrush -- Toothpaste
Cereal -- Carrot	Carrot -- Bunny
Monkey -- Chicken	Chicken -- Barn
Hammer -- Shovel	Shovel -- Plant

The order of presentation of the similarity and thematic relationships and the hands to which the similarity and thematic objects were presented were alternated across trials. The type of relationship which was presented on the first trial was counterbalanced across subjects. The imitation conceptual preference task was one of several tasks administered to the subjects during a 45-minute experimental session. The conceptual preference triads were interspersed among other tasks throughout the session.

Scoring

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Two raters independently coded 18 subjects. Agreement on

occurence of categorical and functional relations was 96%. One raters' transcripts were used for the analyses.

Only nonverbal responses were scored (one verbal description of a relationship was provided by a younger subject and six were provided by older subjects). The subjects were given four scores: (1) the number of imitations of the similarity relationship alone, e.g., flying both the bird and the plane; (2) the number of imitations of the thematic relationship alone, e.g., placing the bird on the egg; (3) the number of imitations of both relationships, e.g., flying both the bird and the plane and placing the bird on the egg; and (4) the number of partial, incorrect or irrelevant actions produced, e.g., flying only the plane, placing the plane on the egg, or kissing the bird.

The subjects' scores were summed across all five triads. Since the total number of actions (summed across all categories) increased with age, all scores were converted to percent of total actions.

RESULTS

The frequencies of childrens' productions of thematic and taxonomic relations, alone and together, as well as the number of partial/irrelevant responses, were converted to percent of total actions. The means and standard deviations

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for the percentages are presented in Table 1.

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insert Table 1 about here

For each age group, within-subjects t-tests were conducted to compare relative frequencies of the dependent measures. In the younger age group, subjects were more likely to produce irrelevant actions than taxonomic relations alone, $t(19)=-3.41$, $p=.003$. Similarly, irrelevant actions were more frequent than productions of both thematic and taxonomic responses, $t(19)=3.05$, $p=.007$. The younger subjects were also more likely to produce thematic relations than taxonomic relations, $t(19)=-2.52$, $p=.02$.

In the older age group, as in the younger, subjects were more likely to produce thematic relations than taxonomic relations, $t(20)=-3.36$, $p=.003$. However, unlike the younger subjects, the older subjects' proportion of irrelevant responses was less than that made up by production of both thematic and taxonomic relations, $t(20)=-2.54$, $p=.02$. Also, in contrast to the younger subjects, older subjects produced fewer taxonomic relations alone than both types of relations together, $t(20)=-3.30$, $p=.004$. Finally, irrelevant responses were less frequent than thematic relations, $t(20)=2.47$, $p=.023$.

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Between-groups t-tests were conducted for all dependent measures, with age as the independent variable. Older subjects produced a greater proportion of responses involving both types of relations, $t(39)=-2.98$, $p=.005$, and a smaller proportion of irrelevant responses, $t(39)=3.44$, $p=.001$, than did younger subjects. The two groups did not differ in the proportion of responses which involved thematic or taxonomic relations alone.

DISCUSSION

In the present study it was demonstrated that the triad method, adapted as an elicited imitation task, was successful in eliciting both thematic and taxonomic relations in subjects younger than three years of age. The results are consonant with recent research which suggests that young children can organize concepts either thematically or taxonomically. In the present research, 21-month-old subjects and 33-month-old subjects produced thematic and taxonomic relationships between the objects presented to them. With scores converted to percent of total actions, although both ages preferred thematic relations, this preference did not differ with age. This indicates that similarity and thematic bases of organization are available to the younger and the older subjects.

An important developmental change in classification

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behavior is nevertheless indicated by the data. Two separate yet related age differences were observed: (1) an increase with age in childrens' production of both the thematic and taxonomic relations with the target object; and (2) a decrease with age in the percent of partial or irrelevant responses. It appears that the 21-month-old subjects' conceptual behavior was less flexible than that of the 33-month-olds. That is, the 21-month-olds were much less likely to produce both the thematic and taxonomic relations for the same target object. Instead of putting the bird on the egg and then flying the bird with the plane, the younger subjects were likely to place the bird on the egg and fly only the plane. Notice, then, that their failure to produce both relations was not due to a lack of interaction with all three objects. Rather, it was a failure to demonstrate both relationships for the same target object, i.e., the bird.

The younger subjects' failure to coordinate the similarity and thematic relationship for the same target object was also not due to a greater number of actions being produced by the older subjects, since the results are based on percent of total actions, rather than raw frequencies. Furthermore, the 21-month-olds spent a greater proportion of their actions in partial or irrelevant responses. Proportionally, the increase with age in "both" responses is compensated for by a decline in irrelevant actions.

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Demonstration of increased willingness on the part of older subjects to allow the same object to participate in both a taxonomic and a thematic relationship could be taken as evidence for either of two hypotheses. One possibility is that multiple relations are a part of a greater proportion of the older subjects concepts, than the younger subjects'. That is, older children have a richer knowledge base for a greater number of their concepts. Alternatively, it could be argued that younger and older subjects share the same competence but differ in their performance. Older children may be better able to express what they know about linkages between concepts. Our data do not supply unequivocal support for either hypothesis. They do suggest, however, that even 21-month-olds can, to some degree, coordinate multiple relations for the same target concept.

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Table 1

Means and standard deviations of percent of actions which involved thematic and/or taxonomic relations in 21-and 33-month-olds

	21 Months		33 Months	
Percent	M	SD	M	SD
Taxonomic Only	15	13	9	22
Thematic Only	31	19	38	23
Both	16	18	33	19
Irrelevant	38	18	20	14

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